INDEX

SECTION 01700

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Closeout Procedures.

B. Project Record Documents.

C. Operation and Maintenance Data.

D. Warranties and Bonds.

E. Spare Parts and Maintenance Materials.

F. System Demonstrations and Instructions to Owner.

1.2 RELATED REQUIREMENTS

A. Section 01005 - Administrative Provisions.

B. Section 01400 - Quality Control.

1.3 CLOSEOUT PROCEDURES

A. Comply with procedures stated in General Conditions of the Contract for issuance of Certificate of Substantial Completion.

B. Owner will occupy Project for the purpose of conducting business under provision stated in Certificate of Substantial Completion.

C. When Contractor considers Work to be substantially complete, submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Owner inspection.

1.4 PROJECT RECORD DOCUMENTS

A. Maintain one record copy of:

1. Contract Drawings.

2. Specifications.

3. Addenda

4. Design Clarifications (DCVRs).

5. Change Orders and other modifications to the Contract.

6. Reviewed Shop Drawings, Product Data, and Samples.

7. Field test records.

8. Inspection certificates.

9. Manufacturer's certificates.

10. Construction photographs.

B. Store Record Documents and samples in clean, dry, and legible condition in Field Office apart from documents used for construction.

C. Keep Record Documents and samples available for inspection by Contracting Officer.

D. Record actual construction information on a set of blue line opaque Construction Document Drawings.

E. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.

F. Legibly mark Contract Drawings and Shop Drawings to record actual construction, including:

1. Field changes of dimension and detail.

2. Changes made by Addenda.

3. Changes made by Modifications.

4. Details not on original Contract Drawings.

5. References to related shop drawings and Modifications.

G. Legibly mark Contract Specifications to record actual construction, including:

1. Manufacturer, trade name, and catalog number of each product actually installed, particularly optional items and substitute items.

2. Changes made by Addenda and Modifications.

H. Upon request by the Contracting Officer submit complete collection of Record Documents to the Contracting Officer for review and duplication as desired.

I. Prior to request for final inspection, submit record documents to the Contracting Officer for review. Documents shall bear a statement signed by a legal representative of the Contractor

indicating that the Record Documents reflect "as-built" conditions. Correct and resubmit to Contracting Officer until Contracting Officer accepts the Record Documents as complete.

J. At Contract closeout, deliver corrected Record Documents to the Contracting Officer. Contract Drawings will be provided to the Contractor by the Contracting Officer in AutoCAD format. CAD files shall be modified as necessary to correctly show all features of the Project as it has been constructed by bringing the contract set into agreement with the approved preliminary as-built prints. Upon completion, the as-built Drawing set shall be delivered to the Contracting Officer in AutoCAD format, on full-size mylar sheets, and on full-size blue line paper prints, together with the preliminary as-built marked prints.

1.5 OPERATION AND MAINTENANCE DATA

A. Provide data for all items, equipment, and equipment components provided so that the Owner's maintenance personnel will have complete service and replacement information required for routine maintenance and repair and to provide maximum usable life. Include data not only for maintainable and repairable items, but also for replaceable but not repairable items. Typical items for which information is required include:

1. Equipment including all components and accessories.

2. Valves, steam traps, pressure gauges, and other piping accessories.

3. Control components.

B. Include the following data for each item as applicable. Some of this data can be extracted from equipment review submittals and included with the O&M manuals.

1. Manufacturer's catalog literature and illustrations.

2. Dimensions and connection sizes.

3. Installation and adjustment instructions, requirements, and recommendations.

4. Parts lists and assembly Drawings.

5. Maintenance, operational, and troubleshooting instructions.

6. Warranty data.

C. Data shall be as provided by the equipment manufacturer or supplier.

D. Data is required for all component items of equipment whether or not the components are products of the equipment manufacturer.

E. Form:

1. Identify each item of the O&M Manual with an item number.

2. Separate each item with consecutively numbered heavy stock divider sheets with plastic index tab. Type item number on both sides of paper inserts.

3. Provide copies of warranties combined with the rest of the data provided for the equipment warrantied.

4. Provide an alphabetical index at the front of the binder that locates individual items by tab number.

5. Precede each item by a copy of the item data sheet attached at the end of this specification section.

6. Material included shall indicate the specific item(s) utilized for this project. Delete or cross out all other items.

7. All material must be clearly readable. "Faxed" then photocopied information is not acceptable.

8. Provide complete operation and maintenance manual submittals. Partial or incomplete submittals required under this section will be returned without review.

F. Binding:

1. Bind the Operation and Maintenance Manuals in three ring, D-ring style binders with page lifters and vinyl covers. Expandable catalog type two-hole binders with soft board covers and metal prong fasteners will not be accepted.

2. Provide multiple binders as required to limit single binder thickness to three inches. Divide binders at logical points. Do not overfill binders.

3. Label the front cover and end panel. Label to include Project title, Project number, date, and facility name.

G. Required Copies and Timing:

1. Submit under cover of an Air Force Form 3000.

2. Review submittals:

   a. Submit for review two copies plus the number required by the Contractor. The Contracting Officer will retain one copy for his reference and the additional reviewed copy will be returned to the Contractor.

   b. Submit for review not less than thirty days prior to substantial completion inspection.

3. Final Operation and Maintenance Manuals:

   a. Provide four complete, reviewed, corrected and accepted Operation and Maintenance Manuals to the Contracting Officer a minimum of five working days prior to Project Substantial Completion Inspection.

1.6 WARRANTIES

A. All manufacturer and supplier standard equipment, item or accessory warranties covered under this Division shall be the Contractor's responsibility under Project warranty period.

B. Equipment, item, or accessory warranties shall commence upon the date of Final Acceptance by the Owner.

C. Transfer all manufacturer and supplier standard equipment, item or accessory warranties to the Owner upon expiration of project warranty period.

D. Any warranties, more stringent than manufacturer's standard, specified or indicated under this Division remain the responsibility of the Contractor before and after expiration of Project warranty period.

E. Minimum manufacturer or supplier warranty is that of the manufacturer or supplier used as the basis of design.

F. Provide duplicate, notarized copies. Execute Contractor's submittals and assemble documents executed by subcontractors and suppliers. Provide Table of Contents and assemble one set in a binder with durable plastic cover. Place the second set in the Operation and Maintenance Manuals combined with the rest of the data provided for the equipment warrantied.

G. Submit material prior to final Application for Payment. For equipment put into use with Owner permission during construction, submit within 10 days after first operation. For items of Work delayed materially beyond Date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.7 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, and maintenance materials in quantities specified in each Section, in addition to that used for construction of Work. Coordinate with Owner, deliver to Project site, and obtain receipt prior to final payment.

B. Provide a table listing extra stock materials required by the various specification sections. At a minimum include specification section number, section name, paragraph, material, date received, received by, and placed stored.

1.8 SYSTEMS DEMONSTRATION AND INSTRUCTIONS TO OWNER

A. Prior to substantial completion, demonstrate operation of each system to Contracting Officer.

B. Prepare a comprehensive training schedule and submit to the Contracting Officer for review and approval a minimum of 14 days prior to planned date of first training session.

C. Prior to substantial completion instruct designated Owner personnel in proper operation, adjustment, and maintenance of equipment and systems, utilizing an accepted Operations and Maintenance Manual.

D. Instruct only those Owner personnel specifically designated by the Contracting Officer. Instruction of other Owner personnel will not meet the requirements of this section.

E. Reference individual Specification Sections for additional Owner instruction requirements.

END OF SECTION

ITEM DATA SHEET

1. Item Name/Drawing Equipment Number:

2. Specification Section/Drawing Number:

3. Manufacturer/Model Number:

4. Size/Capacity:

5. Use And Location: (1)

6. Spare Parts Source:

7. Providers Of Warranty Service:

8. Other Contractor Comments:

(1) This information must be provided for all items. Be as specific as possible.

PART 1 GENERAL

1.9 SCOPE OF WORK

A. Remove existing coal chutes and crushers, ventilation ducts, railings, floor grating, building materials and items as indicated on the Drawings, as required by job site conditions, as scheduled, and as specified herein. Demolition includes the selective removal and subsequent off-site disposal of general building materials as well as limited Hazardous Materials (HM), mechanical, and electrical equipment removal and disposal, including associated appurtenances, for this repair and renovation project.

B. Salvage and store items designated for reuse by the Owner, as indicated on the Drawings and as specified within the contract documents.

C. Removed items and materials not claimed by the Owner or pre-arranged to be disposed of by the Owner shall become the property of the Contractor and shall be disposed of in a legal manner, complying with all Local, State and Federal laws and regulations and these contract documents.

D. Work of the contract comprises the selective removal and disposal of a variety of general building materials as well as incidental quantities of Hazardous Materials. Work under this section shall address both the means of control and handling of limited Hazardous Materials in the work area, as shown on the drawings, as specified herein, and as required for safe and functional completion of the overall renovation project. This project is a renovation effort and not primarily a Hazardous Materials abatement project. Only very limited Hazardous Material removal and handling is anticipated to be required to complete the renovation as designed. The following Hazardous Materials, which may impact this project, are present within the limits of the worksite and in the case of asbestos-containing materials (ACM) relevant sample locations are indicated on project Drawing HM-1. The Hazardous Materials sampling results collected regarding these materials and this project are available as attachments (Table 1 and Table 2) to this specification.

1. Asbestos Containing Materials (see Table 1, below)

2. Lead Based Paint (LBP) (see Table 2, below)

1.10 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Drawing HM-1 and the general provisions of the Contract including General and Supplementary Conditions and Division 1 Specifications Sections apply to this section.

B. The locations and quantities of the Hazardous Materials present in the CAFS Power Plant Crusher Building (Building 115), may impact the demolition being performed, and attention should be directed to these materials in order to complete the project work specified elsewhere. Contractor is expected to coordinate all general as well as Hazardous Material demolition efforts and shall coordinate the work to be completed with all subcontractors in accordance with these specifications. If the Contractor chooses to remove and then reuse/reinstall the exterior ACM Galbestos wall sheathing, metal bracing, and existing structural members in order to provide access/egress for the passage of demolition wastes out and new equipment in, appropriate control methods must be used to assure that releases of HM and asbestos fibers are not experienced.

1.11 QUALITY ASSURANCE

A. Pre-demolition Conference: Conduct conference at project site to comply with pre-construction conference requirements of Division 1.

B. The following specifications and standards (including all applicable addenda and amendments, etc.) form a part of this specification. Latest editions of each specification shall be applicable.

1.	29 CFR 1910	Occupational Safety and Health Standards
2.	29 CFR 1926	Safety and Health Regulations for Construction
3.	40 CFR 61	National Emission Standards for Hazardous Air Pollutants
4.	40 CFR 261	Identification and Listing of Hazardous Waste
5.	ANSI Z87.1 (1989; Z87.1a-1991 Supplement)	Occupational and Educational Eye and Face Protection
6.	ASTM D 4397 (1991)	Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications

1.12 DEFINITIONS AND ABBREVIATIONS

A. Certified Industrial Hygienist (CIH):
An Industrial Hygienist who is certified by the American Board of Industrial Hygiene, as an Industrial Hygienist in comprehensive practice. For this project a CIH is also required to have at a minimum current AHERA certification as an Asbestos Inspector and Designer as well as demonstrable Lead Based Paint qualifications and experience.

B. Competent Person (CP):
A person who is capable and trained in identifying existing and predictable hazards, asbestos and hazardous materials in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees and who has authorization to take prompt corrective measures to eliminate them. In addition, the Competent Person shall be capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32 (f). For Class I and Class II asbestos work the Competent Person shall be specially trained in accordance with EPA's Model Accreditation Plan (40 CFR Part 763) for supervisor, or its equivalent. At a minimum, the CP shall also have completed the 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) and Supervisor training courses (29 CFR 1910.120). The Competent Person shall maintain a current certificate as an Alaska Asbestos Abatement Worker and have received Lead Based Paint training. The CP shall have demonstrable qualifications and experience with construction safety and health hazards, Lead Based Paint, engineering controls, safe work practices and personal protective equipment, and must be present at all times during demolition and/or hazardous material abatement efforts.

C. Contractor
The Contractor is that individual, or entity under contract to the Owner to perform the herein listed work.

D. Existing to Remain: Protect construction indicated to remain against damage and soiling during demolition. Items may be removed to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations.

E. Industrial Hygienist (IH):
An Industrial Hygienist (IH) in compliance with State of Alaska AS 45.50.477 (A)-(C), who has earned a baccalaureate or graduate degree in industrial hygiene, biology, chemistry, engineering, physics, or closely related physical or biological science from an accredited university and has acquired competence in industrial hygiene through special studies or work experience sufficient to provide the ability to anticipate and recognize the environmental factors and stresses associated with work and work operations and understand their effects on people and their well being; evaluate on the basis of training and demonstrated work experience and with the aid of quantitative measurement techniques the magnitude of their ability to impair human health and well being; and prescribe methods to prevent, eliminate, control, or reduce the factor and stresses necessary to alleviate their effects. For this project an IH, if retained by the Contractor, is required to have at a minimum:

1. Alaska Asbestos Abatement Worker Certification.

For this project, the Contractor may propose an individual for the IH role and attempt to justify their competence and sufficiency in fulfilling this responsibility by submitting a complete resume detailing the candidate's experience and knowledge within the rubric of industrial hygiene applicable to the job tasks at hand for this specific project. Acceptance of an IH without all of the elements cited above may be allowed if it is apparent that the safety and needs of the Contractor and Air Force can be fully met by the candidate proposed for the project's IH role.

F. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.

G. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in locations indicated.

H. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area.

1.13 SUBMITTALS

A. Site Safety and Health Plan (SSHP): The SSHP shall be approved and signed by the abatement subcontractor's Competent Person. The following concerns, as a minimum, shall be addressed:

1. Anticipate and assess the occupational safety and health hazards expected during the demolition portion of the project. Address potential exposures to lead and asbestos fibers. The lead exposure assessment must be in accordance with the OSHA Lead in Construction Standard 29 CFR 1926.62 (d) and this specification. The asbestos exposure assessment must be consistent with the OSHA Construction Standard for Asbestos 29 CFR 1926.1101(f).

2. Identify engineering controls, work practices and personal protective equipment to be used to assure regulatory compliance, to maintain exposures to the hazards within regulatory limits and to provide for safe and healthy working conditions on the site.

3. Identify training as required by Federal and State of Alaska occupational safety and health regulations and as required to assure worker familiarity with the specific hazards of this job and the protective measures to be taken to assure worker protection.

4. Provide for medical surveillance, including medical removal protection and blood lead assessment for lead exposed workers, if required.

5. Where required, identify sampling, testing, and analytical methods including personal exposure air monitoring for lead exposed workers in accordance with 29 CFR 1926 (d), and Toxic Characteristic Leaching Procedure (TCLP) of waste material.

6. Identify worker and Contractor qualifications as required by federal and state laws and regulations, which assure proper asbestos abatement practices.

B. Receipts for disposal of all materials including general wastes, Lead Based Paint, asbestos, construction debris, Hazardous Materials, and salvaged materials.

1.14 AVAILABILITY OF WORK AREAS

A. Areas in which the work is to be accomplished as determined by the demolition schedule and the Contractor's work plan, will be available upon the issuance of a Notice to Proceed.

1.15 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, or otherwise indicated to be turned over to the Air Force or remain the Air Force's property, demolished materials shall become the Contractor's property, shall be removed from the site, and shall be lawfully disposed of in accordance with the applicable laws and regulations.

PART 2 PRODUCTS

2.1 GENERAL

A. The Contractor shall provide standard commercial quality of all other materials that may be required to complete the work. All materials shall be designed, manufactured, and intended for the use required for the demolition work.

2.2 RESPIRATORS

A. During the performance of demolition work, if conditions require the use of respiratory protection, the Contractor shall provide personally issued and marked respirators approved by NIOSH and provide sufficient replacement canisters for respirators with disposable filters.

B The Contractor provided respirators shall provide the protection factors required by 29 CFR 1926.1101 and 29 CFR 1926.62.

C. Respirators shall be suitable to provide protection from multiple hazards such as lead or asbestos, and solvent vapor hazards, when such multiple hazards exist.

2.3 PROTECTIVE CLOTHING

A. Provide approved protective outer clothing, including but not limited to disposable full body coveralls and hoods fabricated from nonwoven fabric. Eye protection, boots, gloves, aprons, and hard hats shall be provided to meet applicable safety regulations. Coveralls shall be taped securely shut at the gloves and boot tops to exclude water and lead debris. Cloth work clothes may be worn under disposable protective coveralls, boots, and gloves for comfort as permitted by regulation.

2.4 EYE PROTECTION

1. The Contractor shall provide goggles to personnel engaged in demolition operations. Goggles and full facepiece respirators shall meet the requirements of ANSI Z87. 1 (1989).

2.5 ADHESIVES AND TAPE

A. The adhesives and tape used shall be capable of sealing joints of adjacent sheets of polyethylene sheet to finished or unfinished surfaces and of adhering under both dry and wet conditions, including surfaces wet with amended water.

2.6 POLYETHYLENE SHEETING

A. Six-mil (minimum) thick polyethylene film shall conform to ASTM D 4397.

2.7 DISPOSAL CONTAINERS

A. When required, disposal containers shall be suitable to receive and retain the respective Hazardous Materials-containing or contaminated materials and to be deposited at the approved disposal site. The containers shall be labeled in accordance with the applicable regulations and must be both airtight and watertight. Plastic bags, if used, shall be a minimum 6-mil polyethylene, pre-printed with approved warning labels. Plastic wrap, if used for bulky objects, shall be polyethylene sheets, securely wrapped and taped.

2.8 DANGER SIGNS AND LABELS

A. Warning signs and labels shall be affixed to all products or containers containing Hazardous Materials. The required signs shall be used to demarcate areas where asbestos, LBP or other hazardous waste is temporarily stored; and areas not accessible to the public where Hazardous Materials are left in place. Signs and labels shall be in accordance with applicable regulations.

2.9 TOOLS AND EQUIPMENT

A. Water sprayers for dust control application shall be of the airless type.

B. Vacuum cleaning equipment in operation during lead or asbestos abatement projects shall be manufactured specifically for using High Efficiency Particulate Air (HEPA) filters on the discharge.

C. All job site equipment and attachments shall meet all applicable safety regulations.

D. Transportation equipment used to transport wastes, as required, shall be suitable for its intended use and shall be enclosed.

E. The Contractor shall provide all other tools and equipment for removal, enclosure, encapsulation, patching, and disposal activities. Tools and equipment shall be designed for their intended use and shall be maintained in serviceable condition.

PART 3 EXECUTION

3.1 PREPARATION

A. Plan all work in advance, informing the Owner's Representative of procedure and schedule. The Contractor shall coordinate the general demolition and all Hazardous Material abatement with other trades, and all additional schedules and activities associated with the project.

B. Obtain all necessary permits and approval of Contractor's Schedule prior to commencing this portion of the work.

C. Coordinate all required utility shutdowns and disconnects with the Air Force personnel. Notify the Owner's Representative in advance of any required shutdown. Include a description of the affected utility, the extent of the shutdown, the affected areas, and any other conditions or CAFS operations that will be impacted by the shutdown.

D. Prior to commencement of any Hazardous Material demolition activity, a qualified Competent Person (CP) shall inspect the site and identify and evaluate the safety and health hazards that may be encountered in the surroundings and working conditions, and the appropriate work practices, controls and personal protective equipment necessary for worker protection. The CP shall review the results of the inspection with workers assigned to the demolition tasks and may make informal alterations to the Contractor's Site Safety and Health Plan as necessary to address specific site hazards. The CP shall be present on site during all Hazardous Material demolition activities to monitor workplace safety.

E. In the event that the CP identifies an unexpected potential safety and health hazard, the CP shall secure the immediate area to prevent worker exposure and then obtain the Contractor's IH's evaluation of the potential hazard. Materials sampling, if needed to determine the nature of the hazard, is to be completed by the Contractor's IH and/or the Quality Assurance Monitoring Firm, not by the Contractor. If the Contractor's IH determines that a significant safety or health hazard exists requiring abatement activities outside the scope of this project, the Contractor shall notify the Owner's Representative and shall include - in writing - the required corrective action or protective recommendations of the Contractor's IH. If the Owner's Representative agrees that a hazard exists and abatement of the hazard is necessary and outside the scope of this contract, a change order may be negotiated, under the terms of the contract, to address costs of the changed condition. If, in the opinion of the Contractor's IH the hazard does not exist, the project shall proceed immediately with no additional cost to the Owner.

F. Verify that utilities have been disconnected and capped.

G. Survey existing conditions and correlate with requirements indicated to determine extent of demolition required.

3.2 GENERAL DEMOLITION

A. Protect existing buildings and adjacent surfaces, features, and property. Restore to original condition all work damaged or otherwise made defective in appearance or function by the execution of required work under this contract. Interference with the Owner's use of adjacent facilities shall be kept to a minimum and all work resulting in such interference shall be performed at a time approved beforehand by the Owner's Representative.

B. Remove all work carefully. Remove all loose or damaged materials, caused by demolition, or noted or specified to be removed.

C. Carefully remove any materials and equipment noted or specified to be reused or salvaged and handle with care to minimize damage to adjacent materials.

D. Conduct all operations with a minimum of noise.

E. Erect dustproof partitions where demolition work is in progress and as directed. Such partitions shall remain in place until their removal is approved by the Owner.

F. Where openings are to be cut in existing structures, cut such openings with care. Where materials, equipment, door frames, windows, etc. are to be removed, remove such items with care to minimize damage to adjacent materials.

G. Where demolition involves the removal of asphalt paving, Contractor shall saw cut existing asphalt and leave clean neat edge to match new asphalt paving.

H. Where demolition involves the removal of Portland cement concrete, Contractor shall saw cut existing concrete where shown on the plans, or may remove concrete to nearest expansion joint or other terminal feature. All exposed reinforcing not covered by new connections or other new surface shall be coated with epoxy or other approved corrosion inhibitor to match surrounding surfaces.

I. The use of pneumatic or electric hammers for demolition and cutting purposes within the existing building will not be permitted without prior approval of the Owner.

J After the demolition work in any area is completed, clean all surfaces, etc. before any new construction is started.

K. In areas where the Owner may restrict the use of corridors, exits and the like, remove debris from the building by lowering through enclosed chutes or in containers by hoist. Do not drop debris free of restraining devices for a distance greater than 10 ft.

L. Remove debris being transported for removal through the finished spaces on rubber-tired trucks or dollies and properly covered to minimize spread of dust.

M. Carefully remove any materials and equipment noted or specified to be reused or salvaged and handle with care to minimize damage to adjacent materials.

N. Neatly cut openings and pockets for installation of lintels, anchors, or bearing plates where required.

O. Neatly cut depressions, chases, and the like with carborundum saws where such cuts will be exposed in the finished work.

P. Where openings are to be cut in the existing structure and walls, they shall be completely sealed. Exposed penetrations shall be finished with wall escutcheons.

Q. In areas where doors are to be demolished and/or modified, the contractor will replace any gaps in the flooring to ensure a consistent level surface for the replacement floor surface.

3.3 ASBESTOS

A. The Contractor is not required to prepare or provide an asbestos abatement workplan for this project since it is not anticipated that any ACM will have to be abated to successfully accomplish the planned scope of work. Any abatement work actually initiated to facilitate or complete the project must meet the current standards posed by state and federal occupational health laws and regulations. Sampling results received by the design team for the identification and quantification of ACM building materials in the work area have been provided as an attachment to this specification section, and labeled as Table 1.

3.4 LEAD BASED PAINT

A. The Contractor shall plan and conduct building demolition operations to minimize the generation of lead contaminated dust and debris. An array of sampling results collected by ***NORTECH*** to facilitate the identification of those building materials that have high-lead content painted surfaces has been provided as an attachment to this specification section, as Table 2. It is apparent the virtually all of the site's structural and other metal members or fixtures are coated with LBP, and should be treated appropriately to minimize or eliminate lead dust releases. The Contractor shall adopt procedures, which protect the workers and environment from the creation and release of lead dust and hazardous high-lead content materials.

B. Where required, the Contractor shall provide an exposure assessment in accordance with 29 CFR 1926.62 (d), and will detail this assessment prior to performance of LBP demolition work. Contractor will not be required to use EPA/HUD certified lead workers or supervisors for removal and disposal of building components coated with lead based paint unless the removal effort requires abatement, creates a potential for airborne lead exposure above the lead action level of 30 $\mu gm/m^3$, or involves a lead "trigger task". The Contactor will be required to use EPA/HUD certified lead workers and supervisors for any lead abatement effort that involves a lead "trigger task" or has the potential for creating airborne concentrations in excess of 30 $\mu gm/m^3$. All employees handling lead-based paint shall be provided awareness training.

C. The Contractor shall obtain a composite sample of the project's overall construction debris, and conduct TCLP testing of the composited sample in conformance with 40 CFR 261.24. It is anticipated that the composite samples will pass the TCLP test for lead and can be disposed of as non-hazardous debris. The Contractor's Quality Assurance Firm, in the presence of the Owner's Representative, shall conduct sampling and testing and submit the results of the TCLP test to the Owner's Representative for approval prior to disposal of the construction debris. The cost of sampling and testing will be incidental to the demolition project. In the event that the building debris fails the TCLP test, the Owner's Representative will direct the Contractor in writing to collect the debris for disposal. The Contractor shall not dispose of the construction debris until directed to do so in writing by the Owner's Representative. Hazardous waste generated and disposed of as a result of concentration of LBP by the Contractor shall be considered incidental to the cost of building demolition.

D. Lead contaminated waste, scrap, and debris which may produce airborne concentrations of lead particles, or which fails the TCLP test, shall be stored in drums approved for LBP waste.

E. LBP hazardous waste generated by the Contractor as a result of improper work practices shall be handled, stored, and disposed of in accordance with all applicable requirements at the Contractor's expense.

3.5 DISPOSITION OF MATERIALS - GENERAL

A. Store all materials and equipment salvaged for the Owner in a location on-site, as specified by the Owner's Representative. Contractor shall execute extreme care in the handling of salvaged materials.

B. Remove and properly dispose of all materials or debris resulting from demolition operations from the site. All removed items and materials shall be manifested disposed of in a legal manner, complying with all Local, State and Federal laws and regulations. The Contractor shall provide receipts indicating the final disposition of all materials.

1. Disposal receipts, including manifests, for all Hazardous Material debris including quantities.

2. Disposal receipts or certification of destruction for all construction debris, including quantities.

3. Written acknowledgement for receipt of all salvaged materials, including a description and details.

C. Do not burn wood and inflammable debris resulting from demolition operations on the site.

D. The Contractor is required to pay all costs and dispose of all materials scheduled for demolition or removal off-site at a disposal facility permitted to accept the respective material.

E. Transportation of all construction debris shall be in covered vehicles.

F. Use of explosives will not be permitted.

3.6 NON-HAZARDOUS WASTE DISPOSAL

A. Non-hazardous wastes shall be disposed of in an approved off-site disposal area at the Contractor's expense.

3.7 PROTECTION

A. Protection of Existing Property: Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The Contractor shall take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Owner. Any damaged items shall be repaired or replaced as approved by the Owner's Representative. The Contractor shall coordinate the work of this section with all other work.

B. Provide and maintain suitable barricades, shelters, lights, and danger signals during the progress of the work. These shall meet the requirements of the State and/or local building codes. The Contractor shall be responsible for all barriers until completion of contract. The Contractor shall

be responsible for removing all barriers, danger signals, shelters, lights, etc. from the job site at the completion of the work.

C. Vehicles or equipment may not be operated on landscaped areas without an approved method of protection. All traffic shall be restricted to the established roads or driving surfaces.

D. Environmental Protection: It is intended that the land resources within the project boundaries and outside the limits of permanent work performed under this section be preserved in their present condition or be restored to a condition after completion of demolition that will appear to be natural and not detract from the appearance of the project. The Contractor shall repair or restore to its original condition all landscape features scarred or damaged by equipment or operations. The Contractor shall confine his demolition activities to those areas defined by the plans and specifications.

3.8 DUST CONTROL

A. The amount of dust resulting from demolition shall be controlled by wet methods or HEPA vacuuming to prevent the spread of dust (especially asbestos-contaminated dust) and to avoid creation of a nuisance in the surrounding area.

3.9 CLEAN-UP

A. Debris and rubbish shall be removed and transported in a manner that prevents spillage.

END OF SECTION

PART 1 GENERAL

3.10 DESCRIPTION

A. Work includes forms for concrete, reinforcing steel bars and mesh for concrete, and cast-in-place concrete.

3.11 RELATED SECTIONS

A. None.

3.12 REFERENCES

The following publications form a part of this specification to the extent referenced. The publications are referred to in this specification by basic designation only.

A. AMERICAN CONCRETE INSTITUTE (ACI):

ACI 211.1	Latest Edition, Standard Practice for Selecting Proportions for Normal, Heavy Weight, and Mass Concrete, Latest Edition
ACI 301	Specifications for Concrete for Buildings, Latest Edition
ACI 304R	Guide for Measuring, Mixing Transporting, and Placing Concrete, Latest Edition
ACI 305R	Hot Weather Concreting, Latest Edition
ACI 306R	Cold Weather Concreting, Latest Edition
ACI 306.1	Standard Specification for Cold Weather Concreting, Latest Edition
ACI 315	Details and Detailing of Concrete Reinforcement, Latest Edition
ACI 318	Building Code Requirements for Reinforced Concrete, Latest Edition
ACI 325.9R	Guide for Construction of Concrete Pavements, Latest Edition
ACI 347R	Guide to Formwork for Concrete, Latest Edition
ACI 504R	Guide to Sealing Joints in Concrete Structures, Latest Edition

B. AMERICAN PLYWOOD ASSOCIATION (APA):

Plywood Design Specification (latest edition).

APA Design/Construction Guide - Concrete Forming (latest edition).

C. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM):

ASTM A 615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement, Latest Edition
ASTM A 615M	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement, Latest Edition
ASTM C 33	Concrete Aggregates, Latest Edition
ASTM C 39	Compressive Strength of Cylindrical Concrete Specimens, Latest Edition
ASTM C 143	Slump of Hydraulic Cement Concrete, Latest Edition
ASTM C 150	Portland Cement, Latest Edition
ASTM C 231	Air Content of Freshly Mixed Concrete by the Pressure Method, Latest Edition
ASTM C 260	Air-Entraining Admixtures for Concrete, Latest Edition
ASTM C 309	Liquid Membrane Forming Compounds for Curing Concrete, Latest Edition
ASTM C 494	Chemical Admixtures for Concrete, Latest Edition
ASTM C 881	Epoxy-Resin-Base Bonding Systems for Concrete, Latest Edition
ASTM C 995	Time of Flow of Fiber-reinforced Concrete through Inverted Slump Cone, Latest Edition
ASTM D 1190	Concrete Joint Sealer, Hot-Poured Elastic Type, Latest Edition
ASTM D 4397	Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications, Latest Edition

D. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

Manual of Standard Practice (latest edition).

3.13 TESTING AND INSPECTION SERVICE

A. Employ a qualified independent engineering testing agency to prepare mix design and to verify that materials and mix design comply with specified requirements.

3.14 SUBMITTALS

A. Submit placing Drawings conforming to ACI 315, Chapter 3.

3.15 ENVIRONMENTAL CONDITIONS

A. Cold weather: ACI 306.1. Cold weather is defined as a period when for more than 3 consecutive days the mean daily temperatures drop below 40 degrees F (5 degrees C). When temperatures above 50 degrees F (10 degrees C) occur during more than half of any 24-hour period, the concrete should no longer be regarded as winter concrete. Heating of concrete should not exceed 90 degrees F (32 degrees C).

B. Inclement weather: Protect freshly placed concrete against damage by infiltration of any adverse weather. When damage might occur: (1) stop the concrete placement against the nearest construction joint or bulkhead and (2) cover the concrete at once with water proof protection until concrete has set.

C. Sprayed-on Protective Coatings: Apply in accordance with manufacturer's written instructions. Do not apply when rain is forecast within 24 hours.

D. Hot Weather: ACI 305R. Work plans must include preparation to limit the temperature affects on concrete. As the selected limiting temperatures, usually but not always between 75 degrees F (24 degrees C) to 100 degrees F (38 degrees C) is approached and exceeded, unfavorable effects of high temperature are likely.

PART 2 PRODUCTS

4.1 GENERAL

A. Form surfaces may be of any material which provides required structural strength and surface properties to produce specified finish.

B. Reinforcing bars to be ASTM A 615, Grade 60, size #4 and larger, unless specified otherwise. Bars that are #3 may be ASTM A 615, Grade 40.

C. Dowels to be deformed reinforcement bars, ASTM A615, Grade 60.

D. Concrete, General:

1. Portland Cement: ASTM C 150.

2. Aggregates: ASTM C 33.

3. Water: Potable.

E. Admixtures:

1. Air Entrainment: ASTM C 260.

2. Chemical Admixtures: ASTM C 494.

3. Pozzolanic Admixtures: ASTM C 494.

4. High-Range Water-Reducing Admixtures (Superplasticizers): ASTM C 494.

F. Curing Materials:

1. Moist Curing: Mats, Burlap, Sand.

2. Impervious Sheet Covering:

a. Polyethylene Sheet: ASTM D 4397.

b. Polyethylene Coated Kraft Paper.

3. Liquid Membrane: ASTM C 309.

4.2 FABRICATION OF REINFORCING STEEL

A. Fabricate steel as shown or indicated by Drawings and as required to carry out the intent of the Drawings meeting standard detailing practices (CONCRETE REINFORCING STEEL INSTITUTE (CRSI) Manual of Standard Practice - latest edition). Detail reinforcing bars in accordance with the ACI Detailing Manual and the ACI Building Code Requirements for Reinforced Concrete, latest edition. Horizontal pedestal and curb reinforcing shall be continuous around corners and intersections; provide corner bars. Lap all reinforcing the larger of 24 inches or 36 bar diameters

4.3 CONCRETE MIXES

A. Plant Mix:

1. Strength at 28 days:

a. Structural application: F'c = 4000 psi (minimum) concrete with 4 to 6 percent air entrainment.

2. Aggregate Size: ASTM C 33.

3. Proportions: ACI 211:1.

4. Cement: As needed for concrete strength.

5. Maximum aggregate size to be 3/4 inch minus for finished slabs and curbs, 75 percent of minimum clear space between steel or between steel and forms in formed concrete.

6. Maximum Water/Cement ratio: 0.45.

7. Slump of concrete:

a. Structural applications: 4 to 6 inches maximum.

4.4 ADMIXTURES

A. Other than specified herein, or by reference, admixtures may be used only on written acceptance of the Contracting Officer.

PART 3 EXECUTION

5.1 DESIGN AND CONSTRUCTION OF FORMS

A. General: The sole responsibility for form design and for any resulting structural damage due to form failure rests with the Contractor.

B. Conform to ACI 301 Chapter 4.

5.2 INSTALLATION OF REINFORCING STEEL

A. Follow ACI 301 Chapter 5, CRSI "Manual of Standard Practice", and the Uniform Building Code, latest edition, for detailing and placing reinforcing.

B. Steel shall be thoroughly cleaned of rust, mill scale, or coating that will reduce or destroy bond.

C. Do not bend bars in a manner injurious to the material. Bend bars cold. Do not use bars with kinks or bends not shown on the Drawings.

D. Minimum concrete cover for reinforcement shall be in accordance with ACI 301, Chapter 5.

1. Concrete poured in forms 1 1/2 inches.

2. Concrete pedestal place reinforcing at mid-depth for thickness 6 inches to 12 inches.

5.3 PREPARATION OF CONCRETE

A. General: ACI 318, Chapter 6.

B. Embedded Items: Secure accurately and permanently in place and obtain approval before placing concrete.

C. Forms: Complete, obtain Contracting Officer's statement of non-objection before placing concrete.

D. Reinforcing Steel: Concrete placement cannot commence on any part of a scheduled pour until all steel placement for the pour has been accomplished and has been inspected and accepted. Allow time for correction of deficiency items before starting placement.

E. Concrete shall be produced in accordance with ACI 301, Chapter 7. Concrete transported by truck mixer or agitator shall be completely discharged within one and one half (1-1/2) hours (1 hour for hot weather concreting) after water has been added to the cement or cement has been added to the aggregate.

5.4 PLACING OF CONCRETE

A. General: All concrete shall be placed in accordance with ACI 301, Chapter 8, and ACI 304R.

B. Do not add water to mix after initial mixing.

5.5 FORM REMOVAL

A. General: Forms shall remain in place for time recommended per ACI 347, Article 3.7.

B. Removal: Remove forms with care to avoid damage to concrete.

5.6 FINISHED, FORMED SURFACES

A. General: Perform finishing immediately following form removal. Keep concrete damp until finishing is complete.

B. Patching: (required for all surfaces):

1. Cut honeycomb, gravel pockets and voids over 3/4-inch diameter back to solid concrete.

2. Fill prepared voids with 1:2 cement sand patching mortar.

C. Fill form tie holes with a non-shrinking patching concrete on exposed faces; patch shall match concrete wall finish.

5.7 CURING AND PROTECTION

A. General:

1. Curing and protection of concrete shall be in accordance with ACI 301 unless otherwise specified. Begin curing immediately following form removal. Avoid damage to concrete from vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, and any other activity resulting in ground vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period. Provide moist curing for those areas receiving liquid chemical sealer-hardener or epoxy coating.

B. Moist Curing:

1. Remove water without erosion or damage to the structure.

2. Ponding or Immersion:

a. Continually immerse the concrete throughout the curing period. Water shall not be more than 10 degrees C (20 degrees F) less than the temperature of the concrete. For temperatures between 4 and 10 degrees C (40 and 50 degrees F), increase the curing period by 50 percent.

3. Fog Spraying or Sprinkling.

a. Apply water uniformly and continuously throughout the curing period. For temperatures between 4 and 10 degrees C (40 and 50 degrees F), increase the curing period by 50 percent.

4. Pervious Sheeting:

a. Completely cover surface and edges of the concrete with two thicknesses of wet sheeting. Overlap sheeting 150 mm (6 inches) over adjacent sheeting. Sheeting shall be at least as long as the width of the surface to be cured. During application, do not drag the sheeting over the finished concrete or over sheeting already placed. Wet sheeting thoroughly and keep continuously wet throughout the curing period.

5. Impervious Sheeting:

a. Wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 300-mm (12 inches) minimum. Provide sheeting not less than 450 mm (18 inches) wider than the concrete surface to be cured. Secure edges and transverse laps to form closed joints. Repair torn or damaged sheeting or provide new sheeting. Cover or wrap columns, walls, and other vertical structural elements from the top down with impervious sheeting; overlap and continuously tape sheeting joints; and introduce sufficient water to soak the entire surface prior to completely enclosing.

C. Liquid Membrane-Forming Curing Compound:

1. General: Seal or cover joint openings prior to application of curing compound. Prevent curing compound from entering the joint. Apply in accordance with the recommendations of the manufacturer immediately after any water sheen that may develop after finishing has disappeared from the concrete surface. Provide and maintain compound on the concrete surface throughout the curing period. Do not use this method of curing where the use of Figure 2.1.5 in ACI 305R indicates that hot weather conditions will cause an evaporation rate exceeding 1 kg pf water per square meter per hour (0.2 pound of water per square foot per hour).

2. Application: Unless the manufacturer recommends otherwise, apply compound immediately after the surface loses its water sheen and has a dull appearance, and before joints are sawed. Mechanically agitate curing compound thoroughly during use. Use approved power-spraying equipment to uniformly apply two coats of compound in a continuous operation with the second coat at 90 degrees to the first. The total coverage for the two coats shall be 5 square meters maximum per L (200 square feet maximum per gallon) of undiluted compound unless otherwise recommended by the manufacturer's written instructions. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel. Immediately apply an additional coat of compound to areas where the film is defective. Respray concrete surfaces subjected to rainfall within 3 hours after the curing compound application.

3. Protection of Treated Surfaces: Prohibit pedestrian and vehicular traffic and other sources of abrasion at least 72 hours after compound application. Maintain continuity of the coating for the entire curing period and immediately repair any damage.

D. Curing Periods:

1. Length of curing periods shall be in accordance with ACI 301. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing shall be subject to approval by the Contracting Officer.

E. Requirements for Type III, High-Early-Strength Portland Cement:

1. The curing periods shall be not less than one-fourth of those specified for Portland cement, but in no case less than 72 hours.

5.8 CLEANUP

A. Remove concrete and nails from form material to be reused. Stack forms neatly with nails removed or bent over to prevent injury. Remove all forms from concrete before backfilling.

B. Remove spilled concrete prior to its final set from all surfaces including reinforcing steel to be embedded in a future pour.

C. Clear the construction area of all forms, materials, and debris before departing the site.

END OF SECTION

PART 1 GENERAL

5.9 SCOPE

A. This Section covers general mechanical requirements for Work covered under this Division.

B. All Work and services specifically covered under this Division is supplementary to that covered under other Divisions of these Contract Documents. The requirements of this Division which are more stringent than that covered under other parts of these Contract Documents apply to Work covered under this Division.

C. All incidental Work required but not specified under this Division shall comply with the Division in which it is specified.

D. Review the Drawings and Specifications of all other Divisions for additional Work under Division 15.

5.10 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. General and Supplementary Conditions.

B. Division 1 - General Requirements.

5.11 GENERAL REQUIREMENTS

A. Provide the Owner with complete, coordinated, operating, tested, and adjusted mechanical systems.

B. Place all equipment in operation and instruct the Owner's maintenance personnel as to the proper operation, periodic maintenance, and lubrication of new mechanical equipment and systems.

C. Provide equipment and accessories indicated on the Drawings unless it is specifically indicated that the piping, ductwork, equipment, or accessory is existing.

D. Install equipment in accordance with manufacturer's recommendations, with accessories recommended by the manufacturer for service intended, and with accessories indicated. Should recommendations conflict with Contract Documents contact Contracting Officer for clarification before proceeding.

E. Coordinate the installation of the mechanical systems with the Work of other trades and existing conditions. Route mechanical systems as required to avoid interference with the Work of other trades and existing conditions.

F. Do not scale the Mechanical Drawings. Field verify existing construction and dimensions prior to ordering or fabrication of any materials.

G. Report any errors, discrepancies, or ambiguities to the Contracting Officer who will answer all questions and interpret intended meaning of these Contract Documents. Accept Contracting Officer's interpretation as final.

H. Perform Work in a neat and workmanlike manner with skilled craftsmen specializing in said Work.

I. Provide new equipment and materials direct from the manufacturer unless specifically indicated otherwise. Remanufactured equipment and materials are specifically not acceptable.

J. Provide the product of only one manufacturer for each item or type of item provided in quantity.

K. Where the selection of materials or methods is left to the discretion of the Contractor, faithfully pursue the use of the best available materials or methods suitable for the purpose intended.

5.12 PERMITS, TESTING AND INSPECTIONS

A. Obtain, pay for, and comply with the requirements of all permits, fees and inspections by public authorities required for the Work covered under this Division of the Specifications.

B. Transmit copies of permit applications, permits received, and public authority inspection reports to the Contracting Officer.

C. Test mechanical systems in accordance with the most restrictive procedures as defined under applicable codes or as specified elsewhere under this Division.

1. Provide a minimum of 3 working days notice to Contracting Officer and public authorities prior to performance of test.

2. If less than required notice is given, the Contracting Officer may require the Contractor to repeat the test at no additional cost to the Owner.

3. Test Work prior to insulating or concealing. If less than required notice is given prior to insulating or concealing, the Contracting Officer may require the Contractor to uncover such Work for inspection and recover same at no additional cost to the Owner.

4. Submit certificate of compliance for all tests indicating system tested, results of tests, witnesses and dates prior to calling for substantial completion and final inspections.

5. During testing, isolate piping system equipment and accessories that are not rated to withstand test pressures or perform test prior to connection of such equipment and accessories to the piping system.

D. Substantial Completion and Final Inspections:

1. Provide minimum of 14 calendar days notice to Contracting Officer and public authorities of intent to have Work ready for inspection. Confirm that Work will be ready for inspection a minimum of 3 working days notice prior to requested inspection.

2. Prior to inspection:

a. Deliver to the Contracting Officer required equipment, Drawings, and records.

b. Clean fixtures and equipment. Remove manufacturer's stickers and leave free of dust and dirt.

c. Remove boxes, scrap, and other debris.

d. Touch up holidays or damaged painted surfaces.

e. Contractor's Mechanical Administrator, licensed by the State of Alaska, shall review mechanical systems installation for conformance with Contract Documents. With request for inspection, Contractor's Mechanical Administrator shall verify in writing that this review has been performed and note anything not conforming to Contract Documents.

f. With request for reinspection of Work previously inspected, provide the Owner's previous inspection's deficiency list accompanied by an item by item statement of measures taken to correct the previously listed deficiencies.

g. Deliver to Owner personnel all special tools and devices furnished by the manufacturer with items, specialties or equipment to allow installation, disassembly, adjustment, repair or maintenance. Identify special tools or devices as to item to which it is applicable.

h. Provide mechanical receivables that the Owner is to receive upon completion of the Project. Turn over an inventory list of materials provided for the Owner's use to the Contracting Officer prior to scheduling substantial completion and final inspections.

i. Deliver to the Contracting Officer a Certificate of Instruction signed by all Owner personnel receiving instruction, all Contractor personnel providing instruction, and indicating dates of instruction.

3. During inspection:

a. Provide complete and operating systems suitable for the season.

b. Demonstrate that the mechanical system performs in accordance with the Contract Documents. Provide material and personnel required to perform the demonstration.

c. Provide assistance to inspection personnel required for a complete and thorough inspection.

5.13 CODES, ORDINANCES, AND STANDARDS

A. Federal, State and local Codes and Ordinances take precedence over these Specifications and Drawings where conflicts occur unless the Drawings or Specifications call for more stringent requirements. Notify the Contracting Officer in writing of conflicts.

B. Follow latest adopted editions of Code of Federal Regulations, Alaska Administrative Code, Uniform Building Code, Uniform Mechanical Code, Uniform Plumbing Code, Uniform Fire Code, National Electrical Code, ADA Accessibility Guidelines, NFPA, ASME, NEMA, ASHRAE, SMACNA, etc. as applicable.

C. Comply with all applicable laws, building and construction codes, OSHA Safety and Health Regulations and applicable requirements of any governmental agency under whose jurisdiction this Work is being performed.

5.14 MECHANICAL ABBREVIATIONS

Any or all of the following may appear in the Mechanical Drawings and Specifications and shall be applied per the following explanations. Other abbreviations and initials which may appear in the Mechanical Drawings and Specifications are intended to have the meanings commonly accepted in the mechanical construction industry. Contact the Contracting Officer for definition if any question arises concerning other abbreviations and initials.

&	AND
@	AT
#	NUMBER OR POUNDS
A	AIR
AFF	ABOVE FINISHED FLOOR
AGT	AVERAGE GLYCOL TEMPERATURE
AHU	AIR HANDLING UNIT
APD	AIR PRESSURE DROP
APPR	APPROVED
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
ASSOC	ASSOCIATED
AUTO	AUTOMATIC
AV	ACID VENT
AW	ACID WASTE
BAL	BALANCING
BFW	BOILER FEED WATER
BHP	BRAKE HORSE POWER
BTUH	BRITISH THERMAL UNITS PER HOUR

C	DEGREES CELSIUS
C	COMMON
CAPAC	CAPACITY
CFM	CUBIC FEET PER MINUTE
CI	CAST IRON
CHWS(R)	CHILLED WATER SUPPLY AND RETURN
CLG	CEILING
CLG	COOLING
CO	CLEAN OUT
CR	CONDENSATE RETURN
C_V	VALVE COEFFICIENT
CW	COLD WATER
CWS(R)	CONDENSER WATER SUPPLY (RETURN)
DB	DECIBEL
DB	DRYBULB
DI	DUCTILE IRON
DIA	DIAMETER
DN	DOWN
DWDI	DOUBLE WIDTH DOUBLE INLET
EA	EACH
EA(D)	EXHAUST AIR (DAMPER)
EAT	ENTERING AIR TEMP
EF	EXHAUST FAN
EGT	ENTERING GLYCOL TEMP
ELEC	ELECTRICAL
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
EX	EXISTING
EXIST	EXISTING
F	DEGREES FAHRENHEIT
FC	FORWARD CURVED
FD	FLOOR DRAIN
FIN	FINISH
FLA	FULL LOAD AMPERAGE
FLEX	FLEXIBLE
FPM	FEET PER MINUTE
GA	GAUGE
GAL	GALLONS
GALV	GALVANIZED
GCHWS(R)	GLYCOL CHILLED WATER SUPPLY (RETURN)
GCNWS(R)	GLYCOL CONDENSER WATER SUPPLY (RETURN)
GFCI	GOVERNMENT FURNISHED CONTRACTOR INSTALLED
GHRS(R)	GLYCOL HEAT RECOVERY SUPPLY (RETURN)
GHS(R)	GLYCOL HEATING SUPPLY (RETURN)
GI	GALVANIZED IRON
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
H_20	WATER
HB	HOSE BIBB

HP	HORSEPOWER
HPS	HIGH PRESSURE STEAM
HR	HOUR
HTG	HEATING
HW	HOT WATER
HWS(R)	HEATING WATER SUPPLY (RETURN)
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IN	INCH
INSUL	INSULATION
IPS	IRON PIPE SIZE
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
LB/HR	POUNDS PER HOUR
LF	LINEAL FOOT
LGT	LEAVING GLYCOL TEMPERATURE
LPS	LOW PRESSURE STEAM
MATL	MATERIAL
MAX	MAXIMUM
MBH	ONE THOUSAND BTU PER HOUR
MECH	MECHANICAL
MIN	MINIMUM
MTR	MOTOR
NC	NORMALLY CLOSED OR NOISE CRITERIA
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NPSH	NET PUMP SUCTION HEAD
NTS	NOT TO SCALE
OBVD	OPPOSED BLADE VOLUME DAMPER
OC	ON CENTER
OD	OUTSIDE DIAMETER
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
OFOI	OWNER FURNISHED OWNER INSTALLED
ORD	OVERFLOW ROOF DRAIN
ORL	OVERFLOW RAIN LEADER
OSA(D)	OUTSIDE AIR (DAMPER)
OSAT	OUTSIDE AIR TEMPERATURE
P&TRV	PRESSURE AND TEMPERATURE RELIEF VALVE
PD	PRESSURE DROP
PH	PHASE
PRDV	PRESSURE REDUCING VALVE
PRV	PRESSURE RELIEF VALVE
PSI	POUNDS PER SQUARE INCH
RA(D)	RETURN AIR (DAMPER)
RD	ROOF DRAIN
RHW	RECIRCULATED HOT WATER

RL	RAIN LEADER
RP	RADIANT PANEL
RPM	REVOLUTIONS PER MINUTE
SH	SHOWER
S/M	SHEET METAL
SP	STATIC PRESSURE
SPEC	SPECIFICATIONS
SS	STAINLESS STEEL
S/S	START/STOP
ST	STEAM
SWS	SINGLE WIDTH SINGLE INLET
TDH	TOTAL DYNAMIC HEAD
THW	TEMPERED HOT WATER
TP	TRAP PRIMER
TYP	TYPICAL
V	VOLTS OR VENT
VAV	VARIABLE AIR VOLUME
VERT	VERTICAL
VOL	VOLUME
VTR	VENT THROUGH ROOF
W	WASTE
W/	WITH
W/O	WITHOUT
WB	WET BULB
WG	WATER GAUGE
WHA	WATER HAMMER ARRESTOR

5.15 MECHANICAL COMPLIANCE RECORD

A. Record the performance of all tests, sterilization, cleaning, flushing and refilling of mechanical systems required under this Division.

B. Include date, time and time interval, test results, brief description of method of tests, and witnesses.

C. Submit this record to the Contracting Officer prior to scheduling substantial completion and final inspections.

5.16 INSTRUCTION OF OWNER'S PERSONNEL

A. Instruct designated Owner personnel in the proper operation, periodic maintenance and lubrication of the project's mechanical systems, equipment and accessories utilizing an accepted Operations and Maintenance Manual.

B Instruct only those Owner personnel specifically designated by the Contracting Officer. Instruction of other Owner personnel will not meet the requirements of this section.

C. Include system operations; periodic maintenance including locations and techniques; periodic lubrication including materials, methods and locations; location of concealed valves, instruments, dampers, etc.; location of electrical breakers and disconnects associated with mechanical equipment; and location of control items.

D. Schedule the instruction period in the same manner as for system tests. The Contractor is obligated to only one instruction period. The instruction period may be divided into more than one period with the concurrence of the Contracting Officer.

5.17 WARRANTY

A. All manufacturer and supplier standard equipment, item or accessory warranties covered under this Division shall be the Contractor's responsibility under project warranty period.

B. Equipment, item, or accessory warranties shall commence upon the date of Final Acceptance by the Owner.

C. Transfer all manufacturer and supplier standard equipment, item or accessory warranties to the Owner upon expiration of project warranty period.

D. Any warranties, more stringent than manufacturer's standard, specified or indicated under this Division remain the responsibility of the Contractor before and after expiration of project warranty period.

E. Minimum manufacturer or supplier warranty is that of the manufacturer or supplier used as the basis of design.

5.18 MECHANICAL WORK IN EXISTING FACILITIES

A. Carefully lay out Work in advance.

B. Verify existing conditions affecting Work, including existing sizes and materials indicated, prior to beginning Work or ordering materials that are affected by existing conditions. Beginning of restoration Work means acceptance of existing conditions. Match existing products and Work unless otherwise noted. Notify Contracting Officer of conflicts in writing.

C. Verify locations and elevations of utilities that are crossed or connected to prior to installation of new Work.

D. When portions of existing mechanical, electrical, structural, etc. conditions are shown, it is not meant to indicate that all of such systems are shown.

E. Repair any damage to building, piping, or equipment with skilled mechanics of the appropriate trade.

F. Coordinate connection of new services to existing building systems, including required systems shut downs, with the Contracting Officer. Limit required shut down periods to a minimum. Isolate, drain, and refill existing systems as required to accommodate Work. Restore existing systems to full operational condition.

G. Cut, move, or remove existing items as necessary for installation of new Work and restore and replace at completion.

H. Remove from site removed materials unless otherwise indicated that the material is to be salvaged for the Owner.

I. Remove, cut, and patch in a manner to minimize damage and to provide means of restoring items to original conditions.

5.19 ASBESTOS FREE MECHANICAL SYSTEMS

A. Provide mechanical systems that do not contain asbestos or asbestos-containing materials.

END OF SECTION

SECTION 15800

PART 1 GENERAL

5.20 SCOPE

A. This Section covers selection, installation, and testing of coal crushers, coal chutes, and accessories.

5.21 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Section 15010 - General Mechanical.

5.22 SUBMITTALS

A. Manufacturer's catalog literature and illustrations for equipment and accessory items.

B. Shop Drawings showing proposed construction details for coal chute fabrications. Provide Shop Drawings matching level of detail and information provided in the Original Construction Shop Drawings provide with the Contract Drawings.

PART 2 PRODUCTS

6.1 COAL CHUTES AND ACCESSORIES

A. Coal chutes and coal dust exhaust hoods: Constructed from AISI 1015 low carbon steel plate.

B. Removable wear plates:

1. Medium carbon, high-strength, quenched and tempered chrome-moly, boron treated plate with minimum BHN hardness value of 360. Ryerson Tull Wearform 400 or equal.

2. Chemical composition: 0.30 percent maximum carbon, 1.15 percent to 1.60 percent manganese, 0.20 percent maximum chromium, 0.10 percent maximum molybdenum, and 0.0005 percent to 0.005 percent boron.

C. Fasteners: ASTM A-307, heavy hex head bolts.

D. Vibrator: Electromagnetic, match existing power requirements; rated for installation in Class II, Group F, Div 1 environment; Syntron Model V-85 or equal.

E. Limit Switches: Fork lever, snap action maintained contact, NEMA 9 enclosure rated for installation in Class II, Group F, Division 1 environment; Allen Bradley 801 CMC 17-4 or equal.

F Hopper Level Switches: Paddle type selected to suit application; cast aluminum housing, flexible stainless steel shaft and couplings, stainless steel paddle; rated for installation in Class II, Group F, Div 1 environments; match existing power requirements; Syntron SXLC or equal.

6.2 COAL CRUSHERS

A. Provide factory packaged coal crushers complete with rolls, housing, motors, drives with guards, and accessories required

B. Double roll design selected to reduce 200 tons per hour of the following feed coal down to 1-1/2 inches x 0 size. The crushed product shall contain not more than 10 percent oversize nor more than 40 percent under 3/4 inches round when crushing 100 percent plus 1-1/2 inch coal. The feed coal is "run of mine" coal and will contain large rocks and other tramp material. McLanahan Corporation, American Pulverizing Company, or equal.

Coal Size: Passing 7 inch x 7 inch grizzly.

Moisture Content: 26 percent.

Grindability: 32 to 33 using ASTM Hargrove Index.

Minimum Coal Temperature: Minus 20F.

Volatile Matter: 34 percent.

Fixed Carbon: 30 percent

Ash: 10 percent

Sulpher: 0.17 percent

Heat Content: 7810 BTU/lb.

C. Rolls:

1. Provide unit one fixed roll and one floating roll on spring relief for tramp material protection operating at 150 RPM maximum speed.

2. Segmented design with six cast manganese roll segments per roll; bolt in, tooth-faced.

3. Shafts: AISI 4150 heat-treated alloy steel, 7 inch diameter.

4. Provide hydraulic system with hand pump for floating roll adjustment.

5. Bearings: Double roll spherical, self-aligning, anti-friction roller bearings with minimum B-10 life of 50,000 hours, grease lubricated.

D. Housing:

1. Fabricated from structural steel plate and shapes.

2. Provide with removable plates for access to internal parts and assemblies.

3. Constructed dust tight.

4. Constructed with inlet and outlet flanges for feed and discharge chute connection.

5. Feed hopper provided with 3/4 inch thick, renewable, abrasion resistant steel side liners.

6. Provide with structural steel base frame, heavy-duty, braced and reinforced.

7. Finish: All exterior surfaces factory primed and painted with acrylic enamel paint.

E. Motors:

1. Two each, 40 hp, one for each roll. Coordinate electrical requirements with Division 16.

2. NEMA rated, energy efficient, totally enclosed-fan cooled, 900 RPM, squirrel cage-induction motors. Constructed and labeled for installation in Class II, Group F, Division 1 environment.

3. Moisture resistant, 200 degree C rated copper windings. 1.15 service factor. Class F insulation with Class B rise.

4. Efficiency: Exceed NEMA MG1-12.59 listed efficiencies for energy efficient motors when tested in accordance with IEEE Standard 112.

5. Rated for minimum locked rotor torque of 190 percent and minimum breakdown torque of 240 percent at full load, 650 ft. lbs.

6. Provide automatic adjustable motor base for moveable drive to maintain belt tension.

F. Drive:

1. Dual v-belt with guards.

2. Torque limiter on sheaves to ensure motor disengagement in case of roll stoppage.

3. Two, grooved, balanced fly-wheels, locked to shafts with 4,000 lb-ft^2 Wk^2 value.

6.3 BEARING LUBRICATION SYSTEM:

A. Automatic motorized lubrication systems serving all crusher and crusher motor bearings. Lubriquip Trabon Lubmaster pump and WMP III Maxi-Monitor controller or equal.

B. Provide separate and independent systems serving each crusher.

C. Coordinate requirements of bearing lubrication systems with crusher supplier and provide a completely compatible system.

D. Each system to include electric motor, pump, reservoir, low-level switch, high pressure blow out switch assembly, control panel, alarm horn, and divider valve for independently adjustable metering of lubricant flow to each bearing served.

E. Provide one drum of lubricant with transfer pump.

F. Provide 1/2 HP motor rated for installation in Class II, Group F, Div 1 location. Coordinate electric requirements with Division 16.

G. Provide control panel rated for installation in Class II, Group F, Div 1 location and including cycle switch, visual alarm, adjustable timer, fuse connections, terminal strip, indicator lights, and contacts for powering alarm horn.

H. Provide system factory packaged, piped, and wired so that field assembly and connections are limited to a single point electrical power connection and connection of bearing distribution lines.

I. Bearing distribution lines: 1/4 inch O.D. carbon steel tubing.

PART 3 EXECUTION

7.1 GENERAL

A. Retain the services of a factory authorized representative to start-up and adjust the coal crushers and the automatic lubrication system for specified performance, demonstrate compliance of the coal crushers and the automatic lubrication system with the contract documents to the Contracting Officer, and provide maintenance and operation instruction for the coal crushers and the automatic lubrication system to power plant maintenance personnel.

B. Provide bearing distribution lines between automatic lubrication system divider valve and crusher and crusher motor bearings.

7.2 COAL CHUTES

A. Unless specifically noted otherwise coal chutes, conveyor enclosure, conveyor loading hoppers, removable wear plates, access panels and doors, flop gates, supports, and accessories are to match existing sizes and construction. Existing sizes and construction are indicated in copies of Original Construction Shop Drawings attached to the Contract Drawings; field confirm dimensions prior to fabrication.

B. Reconfigure coal chute sizes and construction to accommodate new coal crusher inlet and outlet configurations.

C. Reconfigure coal chute sizes and construction to accommodate elimination of sampler.

D. Provide access panels and doors where indicated in Contract Drawings and where indicated in Original Construction Shop Drawings attached to the Contract Drawings. Provide two steel handles welded to each access panel to assist operators in lifting access panels and doors.

E. Provide removable wear plates full width of all sliding surfaces and provide 6 inch wide removable wear plates on surfaces adjacent to the sliding surfaces butted to the removable wear plates provided on the sliding surfaces.

F. Seal coal chute flanged connections with 1/4 inch bead of silicon sealant placed on face of flanges.

END OF SECTION

PART 1 GENERAL

7.3 GENERAL

A. Provide all Work as shown on the Drawings and in these Specifications for a complete, safe, and functional installation. All Work shall comply with the latest edition of the National Electrical Code (NEC).

B. Obtain and pay for all permits, plan reviews and inspections required for the Work covered by this Division of the Specifications.

C. Unless otherwise noted, all materials shall be of new manufacture, and installed before expiration of their shelf life, if applicable.

D. Materials and equipment are to be those of major and reputable manufacturers with ability to render competent and thorough service through local and regional organizations capable of expeditiously providing service, parts and assistance.

E. Materials of similar nature, style, function, purpose and/or appearance shall be like products from the standard product line of the same manufacturer.

F. All products shall be listed by Underwriter's Laboratories for their intended use and location in all cases where UL lists such products. Where no product listed by UL for the application is available, provide certification of performance, function and rating from an independent testing agency or laboratory approved by the Contracting Officer.

G. The omission of express reference to any parts, supplies, services, or facilities necessary for, or incidental to, a complete installation shall not be construed as a release from furnishing such items.

H. Verification is required of all equipment sizes and locations prior to the ordering or installation of connection materials and disconnecting equipment to ensure that the power connections are of the proper size and type, and in the proper location.

I. All materials shall be installed in a neat, orderly, and secure fashion, as required by these Specifications and commonly recognized standards of good workmanship, for which the Contracting Officer's judgment shall be final.

7.4 DRAWINGS

A. Unless otherwise indicated, drawing symbols conform to the applicable standards of ANSI. The Drawings (or Contract Drawings) rely heavily upon symbolic representation of the features shown, and represent exact details only so far as indicated.

1. The Drawings are, to some extent, diagrammatic and are not intended to show exact details.

2. Dimensions scaled from the Drawings may vary due to tracing tolerances, printing distortion, field conditions, field changes, and other factors. For these reasons, it shall be the Contractor's responsibility to field verify dimensions that pertain to his Work. The Contractor shall make minor relocations where necessary to resolve conflicts or present a uniform appearance. The Drawings show exact location of electrical features only where specifically dimensioned.

3. The Electrical Contractor shall review the Contract Documents of the other trades on the Project, and shall coordinate the installation of electrical features with the Work of all other trades.

4. Provide fixtures, devices, equipment, conduit, conductors and accessories indicated on the Drawings unless it is specifically indicated that the fixture, device, equipment, conduit, conductor, or accessory is existing.

7.5 REPAIR OF EXISTING FEATURES

A. Where existing or previously completed building surfaces or other features must be cut, penetrated or otherwise altered for the installation of electrical features, such Work shall be carefully laid out and performed, and any subsequent patching or repairs that it necessitates shall be performed by skilled mechanics of the trades involved.

7.6 REMOVAL OF EXISTING ELECTRICAL FEATURES

A. Where connected to or serving fixtures or equipment being removed, or incidental to the required removal of walls, ceilings, or other features, existing electrical features shall be removed as follows:

1. All abandoned wiring shall be removed back to its source of supply.

2. Exposed items shall be removed in their entirety.

   a. All abandoned exposed conduit, including all abandoned conduit above accessible ceiling finishes shall be removed back to the source of supply, or back to the connection to a still active branch. Cap and properly close all openings in remaining conduits, boxes and enclosures.

3. Concealed items such as raceways and boxes may be abandoned in place if they are completely concealed by the new construction and all conductors are removed or cut back so as to not be re-connectable to any source of power. Provide blank device plates or blank covers in all unused outlet boxes.

   a. Conduits concealed in areas not accessible or that are not being made accessible shall be removed into areas of non-accessibility. Patch to match existing, openings in walls, ceilings, or floors left or created as a result of conduit removal.

   b. Conduits that are being removed and that extend below slab on grade shall be ground flush with the top of the slab, plugged with concrete, and the slab patched to match existing.

4. Where other electrical items are fed through, supported by or attached to a removed item, re-route raceways and/or cut back building surfaces as necessary to rejoin raceways, provide new conductors as necessary, and patch and finish all damaged construction to match surrounding surfaces.

5. Salvage or disposal of removed items shall be as noted on the Drawings and/or as directed by the Owner.

7.7 PROTECTION AND CLEANING

A. All electrical equipment shall, during the entire duration of construction Work, be protected against water, dust, debris, overspray or any other contamination, whether environmental in origin or as a result of construction Work.

B. All construction dust, debris, overspray, scrap and surplus materials, etc. resulting from this Work shall be cleared away, leaving the installation in completely clean condition.

PART 2 PRODUCTS

8.1 RACEWAYS

A. All raceways shall be Rigid Steel Conduit. Liquidtight flexible conduit shall be acceptable only at the transition from the Rigid Steel Conduit to the motor. The Minimum size for all raceways shall be 1/2 inch diameter.

B. Raceways shall be of types and characteristics recognized by the NEC.

C. Materials:

1. Rigid Steel Conduit shall be hot-dip galvanized, Schedule 40 Dimensions with smooth interior; Allied Tube & Conduit, J & L, Triangle, Western Tube & Conduit, Youngstown, or equal; made up with threaded fittings only.

2. Liquidtight flexible conduit, UL 360, Interlocked steel construction with PVC jacket. Fittings: NEMA FB 1. Galvanized malleable iron or steel liquidtight.

8.2 WIRES AND CABLES

A. Provide wire and cable as shown on the Drawings and further specified herein. All wire and cable shall be of types recognized by the NEC and meeting the specifications of the NEC and ICEA.

B. Conductors:

1. All conductors shall be copper, except as otherwise noted. Conductors No. 10 AWG and smaller shall be solid, unless otherwise noted or specified in a product that is only available stranded, such as flexible cords. Conductors No. 8 AWG or larger shall be stranded.

C. Insulation Types:

1. Feeder and branch circuit conductors shall be 600 volt insulated, with type XHHW insulation.

8.3 OUTLET BOXES

A. Boxes shall be deep-type (2-1/8 inch nominal) unless space limitations or Drawing notes require shallower boxes.

1. Fixture outlet boxes for use with concealed raceway systems shall be 4 inch octagonal or square, galvanized sheet Steel.

2. Boxes for wall-mounted devices with concealed raceways shall be galvanized sheet Steel, 4 inches square for up to two devices, and solid ganged boxes for more than two devices.

8.4 OVERCURRENT PROTECTION DEVICES

A. Fuses:

1. Fuses shall be Bussman, Reliance, Shawmut, or pre-approved equal, of the correct voltage rating for the circuit where used, and the following types unless otherwise noted:

2. In service and distribution equipment up to 600 amperes: UL Class RK1, time delay and current-limiting dual-element type, Bussman "Low-Peak" LPN-RK (240v.) and LPS-RK (600v.), or equal.

3. In motor disconnect switches: UL Class K-5, dual-element time-delay type, sized to suit the motor nameplate full load current in accordance with the manufacturer's recommendations for overload and single-phasing protection.

B. Circuit Breakers:

1. Unless otherwise noted, circuit breakers shall be of the molded-case thermal-magnetic type, with the following features:

a. Size, number of poles, and interrupting capacity as shown on the Drawings. Ampere ratings shall be clearly visible, even when the breaker is installed in its appropriate enclosure.

b. Voltage rating to suit the voltage of the system on which they are used.

c. Each breaker pole shall provide both instantaneous and inverse-time tripping, with tripping clearly indicated, and a common-tripping tie to any other poles in the same breaker. Handle-ties are not acceptable for this purpose.

d. Breakers shall be operated by a toggle handle and shall have a quick-make, quick-break, over center switching mechanism that includes a trip-free feature so that the contacts cannot be held closed against tripping currents.

e. Circuit breakers shall be labeled or listed by an independent testing laboratory, and shall conform to the latest NEMA Standards and the short-circuit test parameters of NEMA Publication AB 1.

f. Circuit breakers shall not use solid-state components for any function except ground-Fault tripping.

8.5 GROUNDING

A. All metal raceways, enclosures, other electrical equipment and non-electrical equipment that may pick up harmful potentials from the electrical system shall be securely bonded and grounded as required by the NEC and the Drawings.

B. All grounding conductors and bonding jumpers shall be copper, sized according to the NEC or as noted on the Drawings.

C. Ground rods shall be 3/4 inch x 10 feet-0 inches, except where longer rods are called for on the Drawings, in which case they shall be 3/4X diameter sectional type, length as indicated. All ground rods shall be copper-coated steel, "Copperweld" or equal.

8.6 MANUAL MOTOR STARTER AND PROTECTOR

A. Manual motor starter and protectors shall provide manual motor isolation, manual motor control and overcurrent protection in one compact, integral unit.

B. The manual motor starter and protector shall be horsepower rated with an integral manual disconnect and a single, adjustable full-load current setting for Class 10, solid state overload protection, and a magnetic instantaneous trip preset at 13 times the thermal trip setting for overcurrent and short circuit protection.

C. Units shall be U.L. listed for group motor installation applications.

D. Manual motor starter and protectors shall be Square D Type GV7 or equal, complete with all necessary terminal and device mounting hardware.

8.7 MAGNETIC STARTERS

A. Motor start switches with thermal overloads shall be Square D Class 2510, Cutler Hammer or equal, with red pilot light, resettable overload protection, and toggle handle with guard/lockoff hasp.

B. Unless otherwise noted, magnetic starters shall be:

1. Full-voltage non-reversing starting, with resettable integral motor overload protection.

2. Of the correct voltage rating for the system on which they are installed, with NEMA size and number of poles as shown on the Drawings.

3. Housed in the NEMA enclosure appropriate for the location in which they are installed.

4. With hand-off-automatic switch, red pilot light, and overload reset button in front cover.

5. With 120 volt coil and fused control circuit, control power to be derived from a separate control transformer in each starter enclosure, except for 120 volt motor starters or 208 volt motor starters where a separate neutral is provided to give a 120 volt control circuit.

6. With provisions for field-installation of at least two auxiliary control contacts, both normally-open and normally-closed types.

8.8 DISCONNECT SWITCHES

A. Provide the proper NEMA enclosure to suit the location, or as noted on the Drawings.

B. Provide the proper voltage rating to suit the circuit voltage.

C. Disconnect switches shall have quick-make/quick-break mechanisms with visible blades (when the cover is open), to disconnect all ungrounded conductors.

D. Switch handle positions shall be marked to indicate the ON and OFF conditions, and the handles shall be padlockable in the OFF position. Covers shall be interlocked with the handles to prevent cover opening while switch is ON, and a means shall be provided to permit qualified personnel to defeat this feature.

E. Disconnects shall be fusible, heavy-duty switches, unless otherwise noted. Where disconnects are not readily accessible, they shall be of the non-fusible type, and fusible protection for the circuit shall be provided in an accessible location. Disconnects provided as a "local" disconnect, where short circuit protection is provided by upstream devices, shall be of the non-fusible type.

F. Motor disconnects shall be sized according to their standard, not maximum, ratings.

G. Where separate control voltages are supplied to motor controllers, the disconnect switch shall simultaneously disconnect the control circuits(s) with the power circuit(s).

H. For single-phase motors controlled by a manually operated switch, said switch may suffice as the disconnecting means if all applicable code requirements are met.

8.9 COMBINATION MAGNETIC STARTER/DISCONNECTS

A. Combination magnetic starter/disconnects, also referred to in these Documents as "Combination Mags", shall each consist of a fusible disconnect switch and a magnetic starter as specified above, in a common enclosure with front-mounted operator handle for the disconnect.

PART 3 EXECUTION

9.1 RACEWAYS

A. All conductors shall be run in metal raceways as follows, unless otherwise noted on the Drawings.

B. The substitution of Intermediate Metal conduit for Rigid Steel Conduit where permitted by the NEC is permitted by this Specification, except RSC and IMC shall not be intermixed in any conduit run unless a pullbox or conduit body is provided between them.

C. Exposed raceways shall be run square with the building lines.

D. The final connection to any motor or other rotating or vibrating equipment, or equipment which may require position adjustment after installation shall be made through a slack section of flexible liquid-tight metal conduit 18 inches to 36 inches long. For such connections to pump motors, and to equipment in damp, wet, or exterior locations or in Mechanical Rooms, the flex shall be of the oil-resistant liquid-tight type.

E. Structural members shall not be cut, drilled, or notched for raceways or other electrical features unless specifically accepted by the Engineer.

F. All raceways running from a warm area to a cold area shall be securely sealed inside the warm end with ductseal, a silicone compound not harmful to the wire insulation, or equal. Use sealoff fittings at panels if the feeder conduit enters the top of the panel and is run so as to expose it to different temperatures, such as through attic spaces.

G. Maintain a minimum 6 inch clearance between conduit and piping. Maintain 12 inch clearance between conduit and heat sources such as flues, steam pipes, heating pipes, and heating appliances.

9.2 WIRING AND CABLES

A. Branch circuit conductors shall be color-coded by factory pigmentation of the insulation. Larger conductors may be color-coded by wrapping the ends with colored tape in all enclosures, except that white and green conductors may never be phase-taped for any use other than neutral and ground, respectively. Color-coding shall be consistent throughout the entire installation and shall be as follows:\

	SYSTEM VOLTAGE	
Conductor	208Y/120	480Y/277
Phase A	Black	Brown
B	Red	Orange
C	Blue	Yellow
Neutral	White	Gray
Ground	Green	Green

B. Branch circuit conductors shall be No. 12 AWG copper, except for the following:

1. Where branch circuit conductor sizes are indicated on the Drawings, they shall take precedence over the foregoing. Where field conditions dictate circuit routings that increase conductor lengths beyond what would be expected from the layout shown on the Drawings, they shall be submitted to the Engineer for acceptance.

C. All conductor connections shall be made up securely with solderless pressure connectors such as setscrew lugs, split-bolts, wirenuts, "wingnuts", or suitable crimp fittings. Live-spring connectors which cannot be tightened to a point where conductor deformation occurs (such as "Scotchloks") are not permitted. Each wirenut-type connector shall not contain more than four conductors, regardless of size.

D. Use compression type connectors for copper wire splices and taps, No. 6 AWG and larger. Utilize heat shrink tubing of the proper voltage rating for uninsulated conductors and connectors.

E. Thoroughly clean wires before installing lugs and connectors.

F. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

G. Terminate spare conductors with wire nuts.

H. Where stranded conductors are used, their ends shall be twisted and "tinned" with solder prior to connection, or else terminated with crimp-on connectors (T & B Sta-Kon, or equal), set screw lugs, box lugs, or self-lifting pressure terminals.

I. Flexible cords shall be connected to equipment, fixtures, boxes, or other enclosures only by means of cord-grip bodies or other strain-relief fittings specifically designed for the purpose. NM cable clamps are not permitted for this use.

J. Where conductors or their connectors are to be connected to metal surfaces, the surface shall first be scraped free of any paint, oxide, or other non-conductive substances.

K. Conductors shall be pulled into raceways only by constant-tension pulling methods. Where necessary, use wire-pulling lubricants of a type that is not harmful to conductor insulation and will not harden.

L. Completely and thoroughly swab raceway system before installing conductors.

M. Neatly train and lace wiring inside boxes, equipment, and panelboards.

9.3 MOTOR STARTER/DISCONNECT INSTALLATION

A. Install motor and circuit disconnects as recommended by manufacturer, as required by the NEC, and as indicated on the Drawings.

B. Provide engraved nameplates for all units clearly identifying the equipment served.

C. Do not mount motor and circuit disconnects on vibrating equipment. Fasten securely to supporting structure at walls and mounting stands.

9.4 IDENTIFICATION OF ELECTRICAL EQUIPMENT

A. Panelboards, disconnect switches, push-buttons, selector switches, distribution gear and switches and circuit breakers therein, and the like shall be labeled with laminated plastic labels engraved with white letters on black background. Lettering shall be block style, 1/4 inch tall, except where space limitations, drawing notes, or other requirements in these Specifications dictate otherwise. Labels shall be secured with pop rivets or screws. Adhesive attachment is not acceptable.

B. Terminals on strips shall be numbered with indelible markings on special strips designed for the purpose, and a diagram or typed directory shall be provided in the terminal enclosure to identify the origin, function and destination of each conductor in the enclosure.

C. All conductors in pull or junction boxes or other enclosures shall be permanently and legibly tagged or labeled with panel and circuit numbers or other data which clearly identifies their origin, function and destination.

END OF SECTION

PAST AND PRESENT PERFORMANCE QUESTIONNAIRE

A. **GENERAL INFORMATION**: Please correct any information below known to be inaccurate:

Contractor's Name: _____ Telephone Number: _____
Address: _____ Fax Number: _____
_____ Point of Contact: _____
_____
_____

Project Title and Brief Description of Work: _____*

_____*

Contract Number Provided by Offeror: _____ Dollar Amount: _____*

Contract Period or Dates of Performance Provided by Offeror: _____*
Contractor performed as the ☐ **Prime** Contractor ☐ **Sub**-Contractor ☐ **Key** Personnel.

Note: If offeror holds or has held other contracts with your agency/organization in the last 3 years, please complete separate evaluation forms for those contracts as well.

B. **RESPONDENT INFORMATION**:

Name of Respondent: _____ Title: _____

Address: _____ Telephone Number: _____
_____ Fax Number: _____
_____ Email Address: _____

C. **FAX COMPLETED SURVEY FORM TO**: 907-377-2547 Attn: Lt Jordan Omstead